

Correlations of the number of emerged primary teeth with physical growth among Kurdish children



Sulaimani Dental Journal

Dilsoz A. Ali¹, Niyaz O. Muhammad², Arass J. Noori³ & Fadil A. Kareem⁴

¹ B.D.S, M.Sc (Pediatric Dentistry). Ass. Lecturer of Pediatric Dentistry. Department of Pedodontics, Orthodontics and Preventive Dentistry. School of Dentistry, Faculty of Medical Science, University of Sulaimani, Iraq.

² B.D.S, M.Sc (Preventive Dentistry). Ass. Lecturer of Preventive Dentistry. Department of Pedodontics, Orthodontics and Preventive Dentistry. School of Dentistry, Faculty of Medical Science, University of Sulaimani, Iraq.

³ B.D.S, M.Sc (Pediatric Dentistry). Lecturer of Pediatric Dentistry. Department of Pedodontics, Orthodontics and Preventive Dentistry. School of Dentistry, Faculty of Medical Science, University of Sulaimani, Iraq.

⁴ B.D.S, M.Sc, Ph.D (Preventive Dentistry). Ass. Professor of Preventive Dentistry. Department of Pedodontics, Orthodontics and Preventive Dentistry. School of Dentistry, Faculty of Medical Science, University of Sulaimani, Iraq.

Correspondence to;

Dr. Arass J. Noori
dr.arass@yahoo.com
arass.noori@univsul.edu.iq

Received: May, 2016

Accepted: June, 2016

Published: Accepted for publication

Abstract

Objectives: The need for deeper understanding of the influence of growth parameters on the human dentition is of importance for the dental as well as forensic specialists. The present study tries to provide reference data on normal dental development and to evaluate the influence of age, gender, weight, and height on the number of erupted primary teeth among Kurdish population.

Materials and Methods: A cross-sectional study was carried out over the course of 10 months involving a clinical oral examination, and weight and height measurements of 867 children from patients of health care center in Sulaimani city. All measurements were carried out following standardized guidelines according to the Anthropometric Standardization Reference Manual. A tooth is counted as erupted if any part of its crown has emerged through the gingiva of the oral cavity.

Results: A total of 867 children aged 4-48 months were examined for this study and the numbers of children were categorized in 3-month interval age groups. The overall mean age (\pm S.D.) of the children was 17.1 ± 10.9 months (Males, 17.5 ± 10.8 ; Females, 16.7 ± 10.8). The total number of erupted teeth increased with age with a mean number of erupted teeth of 8.6 teeth/child (For Males: 9.1 teeth/child and for Females: 8.1 teeth/child). Males had more teeth than females by an average of about one tooth per child ($P < 0.05$). Partial correlation coefficients of the total numbers of erupted teeth were positively significant with both height and weight while controlling for age in both males and females ($P < 0.001$). Furthermore, the same results were present, when Z-scores for length/height for age and weight for age were partially correlated with the total number of erupted deciduous teeth while controlling for age ($P < 0.01$).

Conclusions: According to the results of the present study and the data presented; it can be concluded that there is a relation between gender, height and weight and the total number of erupted primary teeth.

Keywords: physical growth, primary teeth eruption, number of teeth.

Cite this article as: Ali DA, Muhammad NO, Noori AJ, Kareem FA. F2 Correlations of the number of emerged primary teeth with physical growth among Kurdish children. Sulaimani Dent J. 2016;3(1): 52-57 .

Introduction:

The age of eruption of the primary teeth has long been of interest for biological and physical anthropological studies⁽¹⁾. Tooth emergence has been widely used as a marker of growth, maturation and biological age in children⁽²⁾. An understanding of the timing and sequence of tooth emergence allows dental professionals to assess whether patterns exhibited by patients fall within the expected range of normal dental development⁽³⁾. The developmental stage of the dentition can be evaluated through a count of the total number of teeth present in the mouth during the active emergence period of the dentition^(4,5).

The eruption of teeth in the mouth is suitable for age estimations during the period when teeth are actively emerging, in the deciduous dentition phase

approximately from the age of 6 months to 2.5 years⁽⁵⁾. Estimations of age can be performed directly by counting the number of teeth in the mouth and reliability of the estimates depends on the reference data available and each population group should preferably have its own standards⁽⁵⁾.

Together with ages based on skeletal development, weight and height, dental age is a method used in assessments of physiological age in children. Dental age can be assessed radiographically and clinically⁽⁶⁾. The use of radiographic methods is, however, very limited in children under three years old because of significant difficulties in obtaining radiographs of infants and also in the lack of appropriate standards⁽⁵⁾.

This method of counting the number of erupted teeth is suitable for most circumstances since it does not require any particular place, equipment or expertise⁽⁵⁾. Numbers of teeth are good indicators of dental maturity, especially in the deciduous dentition where irregularities in dental development such as hypodontia, and supernumerary teeth are rare⁽⁷⁾. Furthermore, the emergence of deciduous teeth is not disturbed by crowding in the dentition^(8,9).

Variation in tooth development is believed to be multifactorial⁽¹⁰⁾. Literature suggests that factors like gender, race, physical development and growth parameters, low birth weight and nutritional status may influence tooth emergence reflecting considerable variation and little information is available on non-white/non-European-derived population^(11,12). Height and weight are strong physical features that reflect the degree of cell and tissue development as well as the nutritional status of the child⁽¹³⁾ and in turn, may pose a significant effect on the eruption process of the dentition.

Previous epidemiological studies of dental growth concentrated either on dating the emergence of a particular tooth or counting the total number of teeth present in the oral cavity at a certain age⁽¹⁰⁾. Furthermore, it is worthy to note that attempts to study the total number of emerged teeth in the oral cavity combine the consequences of multiple factors related to the process of movement and emergence of teeth⁽¹⁰⁾.

The need for deeper understanding of the influence of growth parameters on the human dentition is of importance for the dental as well as forensic specialists. In children, the determination of the number of erupted teeth might contribute to the estimation of age at death, as well as, to the identification procedure of unknown skeletons by trying to find concordance with the disappeared children's characteristics, with the help of which personal identity can finally be confirmed or excluded. However, it also allows the age evaluation of living children with unknown identity, suspected of crime or violence with aggravating circumstances, by the police⁽¹⁴⁾.

Since no previous study is available to examine the number of erupted deciduous teeth among Kurdish populations, the present study tries to provide reference data on normal dental development and to evaluate the influence of age, gender, weight, and height on the number of emerged primary teeth in 4-48 month age group Kurdish population.

Materials and Methods:

A cross-sectional study was carried out over the course of 10 months involving a clinical oral examination, and weight and height measurements of 867 children, as well as a questionnaire, filled out by their parents. Before data collection, permission was obtained from the director of health of Sulaimani city to meet subjects with no obligation. The sample was composed of 867 children (464 males and 403 females) selected

randomly from patients of health care center in Sulaimani city; the children visit these health centers regularly at predefined ages to receive their mandatory vaccinations.

All measurements were carried out following standardized guidelines according to the Anthropometric Standardization Reference Manual⁽¹⁵⁾. Oral examination was done using a dental mirror and probe in the presence of proper illumination. Tooth eruption was defined as having occurred if any part of the crown had pierced the alveolar mucosa⁽¹⁶⁾.

The height of children aged more than two years old were measured standing up using height measuring board that is set up on the wall, the child was placed on the measuring board after removing his (her) shoes, standing upright in the middle of the board the child's ankles and knees should be firmly pressed against the board by child's mother⁽¹⁷⁻¹⁹⁾. Children less than two years old were measured lying down using measuring board that was placed on the table⁽⁸⁾.

The weight of children was measured with children wearing minimal clothing; an electronic digital scale was used for children aged more than two years. The weight of children less than two years was measured using baby weight scale. All measurements were carried out by well-trained nurses following standardization guidelines.

A case recording form was prepared for every child including, despite demographic data, height and weight and eruption status of the dentition. The collected data were analyzed using SPSS version 16.0 for Windows (SPSS Inc, Chicago, IL, USA). Statistical analysis involved descriptive statistics, Student's t-test and partial correlations.

Results:

For simplicity of data presentation, the numbers of children are categorized in 3-month interval age groups. A total of 867 children aged 4-48 months were examined for this study. The overall mean age (\pm S.D.) of the children was 17.1 ± 10.9 months (Males, 17.5 ± 10.8 ; Females, 16.7 ± 10.8). Table 1 shows the distribution of males and females according to their chronological ages.

The distribution of the number of erupted teeth and number of children in each age group is shown in Table 2. The total number of erupted teeth increased with age. For the total sample, males (9.1 teeth/child) showed a higher number of erupted teeth than females (8.1 teeth/child) with a statistically significant difference ($P < 0.05$) and the mean number of erupted teeth was 8.6 teeth per child. Males had more teeth than females by an average of about one tooth per child (Average factor = males mean total number of teeth per child - females mean total number of teeth per child = $9.1 - 8.1 = 1$ teeth/child), Table 2.

Partial correlation coefficients of the total numbers of erupted teeth were positively significant with both

Table 1: The frequency distribution of the study sample by age groups and sex.

Age groups	Gender		Total
	Male	Female	
4-6	72	71	143
7-9	75	76	151
10-12	42	46	88
13-15	67	48	115
16-18	60	43	103
19-21	22	21	43
22-24	20	21	41
25-27	25	15	40
28-30	21	13	34
31-33	15	9	24
34-36	10	9	19
37-39	6	11	17
40-42	9	4	13
43-45	8	10	18
46-48	12	6	18
Total	464	403	867
Total %	53.5	46.5	100

height and weight while controlling for age in both males and females ($P < 0.001$), Table 3. Also, the same results were present, when Z-scores for length/height for age and weight for age were partially correlated with the total number of erupted deciduous teeth while controlling for age ($P < 0.01$), Table 4.

Discussion:

Clinical eruption of deciduous teeth is mainly influenced by hereditary factors⁽²⁰⁾. Counts of erupted deciduous teeth seem not to be related to skeletal maturity⁽²¹⁾. Associations have been reported between numbers of emerged teeth and general physical growth, so that children with greater birth weight and greater postnatal weight and height have had more deciduous teeth⁽²²⁾. Environmental conditions like malnutrition can affect the timing of emergence of deciduous teeth⁽²²⁾. Hence, factors which delay development have a less effect on tooth emergence, therefore it is suitable for age estimation⁽⁵⁾.

Tooth eruption is the process by which a tooth moves from its site of development within the jaws to its final functional position in the oral cavity⁽²³⁾ and the term "tooth eruption" generally refers to the appearance of some part a tooth above the surface of the gingiva⁽²⁴⁾. Weight and height are directly related to

child growth and development, with the number of erupted primary teeth being profoundly influenced by height, which was confirmed by the present study^(13,25). However, height's association with the number of emerged teeth did not occur independently of age. In turn, weight proved to be an explanatory variable for the number of erupted teeth in the present study irrespective of the child's age, which contrasts with findings reported in a previous study⁽¹³⁾.

With increasing age, the mean total number of existing teeth were also increased as more teeth emerge and among age groups, although not always statistically significant, males had more teeth than females by an average of about one tooth per a child. These findings show that males had earlier tooth emergence than females and these results go with other results of research in Korea reported that primary teeth erupted earlier in males than in females⁽²⁶⁾. A study in Pakistan found no differences between males and females⁽²⁷⁾, in contrast to the study done in Jordan⁽²⁸⁾. The reason for the differences of tooth eruption in males and females are still poorly understood⁽²⁹⁾. It is assumed that the earlier onset of the permanent dentition is part of the different sexual maturity of both sexes at a given age⁽³⁰⁾.

For the total sample, weight and height showed a significant positive correlation with the total number of

Table 2: Total number of erupted teeth among age groups.

Age groups 3 month interval		Number of children	Total number of erupted teeth	Number of Teeth/ child	±SD	t-test significance (p-value)
4-6	Male	72	10	0.14	0.512	N.S*
	Female	71	10	0.14	0.593	
7-9	Male	75	159	2.12	2.193	N.S
	Female	76	173	2.28	2.176	
10-12	Male	42	184	4.38	4.004	N.S
	Female	46	202	4.39	2.687	
13-15	Male	67	553	8.25	3.373	N.S
	Female	48	404	8.42	2.827	
16-18	Male	60	713	11.88	4.080	N.S
	Female	43	489	11.37	3.830	
19-21	Male	22	303	13.77	3.280	N.S
	Female	21	250	11.90	5.262	
22-24	Male	20	324	16.20	2.142	N.S
	Female	21	324	15.43	2.039	
25-27	Male	25	435	17.40	2.000	0.024**
	Female	15	234	15.60	2.849	
28-30	Male	21	374	17.81	2.892	N.S
	Female	13	229	17.62	2.663	
31-33	Male	15	277	18.47	1.885	N.S
	Female	9	175	19.44	0.882	
34-36	Male	10	194	19.40	0.966	N.S
	Female	9	172	19.11	1.764	
37-39	Male	6	118	19.67	0.816	N.S
	Female	11	208	18.91	2.587	
40-42	Male	9	176	19.56	1.333	N.S
	Female	4	75	18.75	1.500	
43-45	Male	8	158	19.75	0.463	N.S
	Female	10	200	20	0	
46-48	Male	12	236	19.67	0.651	N.S
	Female	6	120	20	0	
Total	Male	464	4214	9.1	7.363	0.048**
	Female	403	3265	8.1	7.144	
	Both	867	7479	8.6	7.274	

* NS: Not significant, ** Significant P-value (P<0.05).

Table 3: Partial correlation coefficients of the total number of erupted deciduous teeth with height and weight while controlling for age.

Test variable	Control variable	Gender	Height		Weight	
			Correlation coefficient	p-value*	Correlation coefficient	p-value*
Total number of erupted teeth	Age	Male	0.396	0.000	0.253	0.000
		Female	0.349	0.000	0.227	0.000
		Total	0.380	0.000	0.249	0.000

*All p-values are highly significant (P<0.01).

Table 4: Partial correlation coefficients of total number of erupted teeth with z-scores for height and weight while controlling for age.

Test variable	Control variable	Gender	Length/height-for-age z-score		Weight-for-age z-score	
			Correlation coefficient	p-value*	Correlation coefficient	p-value*
Total number of erupted teeth	Age	Male	0.148	0.001	0.151	0.001
		Female	0.142	0.004	0.156	0.002
		Total	0.151	0.000	0.148	0.000

*All p-values are highly significant (P<0.01).

erupted teeth and showed children with more height and weight had more teeth than their peers; this means normal children with better nutrition had more teeth that are to say earlier teeth eruption. This finding goes with other study findings around the world^(12,25).

The association between the number of the erupted primary teeth and weight found in the present study suggest that the oral examination can be used as a supplement in the routine pediatric examination, assisting in the evaluation of child growth and development⁽¹⁶⁾.

Conclusions:

According to the results of the present study and the data presented; it can be concluded that there is a relation between gender, height and weight and the total number of erupted primary teeth.

References:

1. Soliman NL, El-Zainy M a, Hassan RM, Aly RM. Timing of deciduous teeth emergence in Egyptian children. *East Mediterr Health J.* 2011;17(11):875–81.
2. Jelliffe EF, Jelliffe DB. Deciduous dental eruption, nutrition and age assessment. *J Trop Pediatr Environ Child Health.* 1973;19(2):193–248.
3. Woodroffe S, Mihailidis S, Hughes T, Bockmann M, Seow WK, Gotjamanos T, et al. Primary tooth emergence in Australian children: timing, sequence and patterns of asymmetry. *Aust Dent J.* 2010;55(3):245–51.
4. Filipsson R. A new method for assessment of dental maturity using the individual curve of number of erupted permanent teeth. *Ann Hum Biol. Taylor & Francis;* 1975;2(1):13–24.
5. Nyström M, Peck L, Kleemola-Kujala E, Evälahti M, Kataja M. Age estimation in small children: reference values based on counts of deciduous teeth in Finns. *Forensic Sci Int.* 2000;110(3):179–88.
6. Qudeimat MA, Behbehani F. Dental age assessment for Kuwaiti children using Demirjian's method. *Ann Hum Biol.* 36(6):695–704.
7. H. Grahnén, L.E. Granath. Numerical variations in primary dentition and their correlation with the

- permanent dentition. *Odont. Rev.*, 12 (1961), pp. 348–357.
8. BAUME LJ. Physiological tooth migration and its significance for the development of occlusion. I. The biogenetic course of the deciduous dentition. *J Dent Res.* 1950;29(2):123–32.
 9. Nyström M. Spacing during the complete deciduous dentition period in a series of Finnish children. *Proc Finnish Dent Soc Suom Hammaslääkäriseuran Toim.* 1981;77(4):202–10.
 10. Soliman NL, El-Zainy MA, Hassan RM, Aly RM. Relationship of deciduous teeth emergence with physical growth. *Indian J Dent Res.* 2012;23(2):236.
 11. Holman DJ, Yamaguchi K. Longitudinal analysis of deciduous tooth emergence: IV. Covariate effects in Japanese children. *Am J Phys Anthropol.* 2005;126(3):352–8.
 12. Corrêa-Faria P, Leite-Faria L, Viana ANN, Marques LS, Ferreira FOO, Ramos-Jorge ML, et al. Factors associated with number of erupted primary teeth in Brazilian children: a cross-sectional study. *J Dent Child.* 2012;80(3):111–4.
 13. Oziegbe EO, Adekoya-Sofowora C, Folayan MO, Esan TA, Owotade FJ. Relationship between socio-demographic and anthropometric variables and number of erupted primary teeth in suburban Nigerian children. *Matern Child Nutr.* 2009;5(1):86–92.
 14. Foti B, Lalys L, Adalian P, Giustiniani J, Maczel M, Signoli M, et al. New forensic approach to age determination in children based on tooth eruption. *Forensic Sci Int.* 2003;132(1):49–56.
 15. T. G. Lohman, A. F. Roche, and R. Martorell, *Anthropometric Standardization Reference Manual, Human Kinetics, Champaign, Ill, USA, 1988.*
 16. Nofely A, others. Deciduous tooth emergence in relation to somatic growth and nutritional status in a Middle Eastern population. *Egypt Dent J.* 2002;48:1201–6.
 17. FL T. Evaluating nutritional status of infant and children. In paige D.M. eds. *Clinical nutrition.* 2nd ed., The C.V. Mosby comp. St. Louis. Washington D.C.Toronto.1988,pp: 119-136.
 18. Boss LP, Toole MJ, Yip R. Assessments of mortality, morbidity, and nutritional status in Somalia during the 1991-1992 famine: Recommendations for standardization of methods. *J Am Med Assoc.* 1994;272(5):371–6.
 19. Buckler J.M.H. Growth disorder in children . *BMJ Publishing group.* 1994; 1994,pp:32.
 20. HATTON ME. A measure of the effects of heredity and environment on eruption of the deciduous teeth. *J Dent Res.* 1955;34(3):397–401.
 21. Billewicz WZ, Thomson AM, Baber FM, Field CE. The development of primary teeth in Chinese (Hong Kong) children. *Hum Biol.* 1973;45(2):229–41.
 22. Delgado H, Habicht JP, Yarbrough C, Lechtig A, Martorell R, Malina RM, et al. Nutritional status and the timing of deciduous tooth eruption. *Am J Clin Nutr.* 1975;28(3):216–24.
 23. Marks SC, Schroeder HE. Tooth eruption: theories and facts. *Anat Rec.* 1996;245(2):374–93.
 24. Sadakatsu S, Patricia P. *Eruption of permanent teeth.* Ishiyaku Euro America, Inc. Publishers 1990.
 25. Haddad AE, Correa MSNP. The relationship between the number of erupted primary teeth and the child's height and weight: a cross-sectional study. *J Clin Pediatr Dent.* 2005;29(4):357–62.
 26. Choi NK, Yang KH. A study on the eruption timing of primary teeth in Korean children. *ASDC J Dent Child.* 2001;68(4):244–9, 228.
 27. Saleemi MA, Hägg U, Jalil F, Zaman S. Timing of emergence of individual primary teeth. A prospective longitudinal study of Pakistani children. *Swed Dent J.* 1994;18(3):107–12.
 28. Al-Batayneh OB, Shaweesh AI, Alsoreeky ES. Timing and sequence of emergence of deciduous teeth in Jordanian children. *Arch Oral Biol.* 2015;60(1):126–33.
 29. Wedl JS, Schoder V, Blake FAS, Schmelzle R, Friedrich RE. Eruption times of permanent teeth in teenage boys and girls in Izmir (Turkey). *J Clin Forensic Med.* 2004;11(6):299–302.
 30. Ritz-Timme S, Cattaneo C, Collins MJ, Waite ER, Schütz HW, Kaatsch HJ, et al. Age estimation: the state of the art in relation to the specific demands of forensic practise. *Int J Legal Med.* 2000;113(3):129–36.